



## LIGHTING SPECIFICATION FOR

# Gunnison Skate Park

Skate Park Lighting Project  
Gunnison, CO

### **PART 1 – GENERAL**

#### **1.1 SUMMARY**

- A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
- B. We are looking for a turnkey project. Please include all installation costs in your bid. The city will provide power to the site.
- C. The purpose of these specifications is to define the performance and design standards for Gunnison Skate Park in Gunnison Colorado. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
- D. The sports lighting will be for the following field:
  - 1. Skate Park
- E. The primary goals of this sports lighting project are:
  - 1. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore, light levels are guaranteed for a period of 25 years.
  - 2. Environmental Light Control: These fields are located in the skate park area, along the property line on the west, highway to the north and runway to the south. It is the primary goal of this project to minimize spill light and glare.
  - 3. Life-cycle Cost: In order to reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated, and the field should be proactively monitored to detect luminaire outages over a 25 year life-cycle. To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system.
  - 4. Control and Monitoring: To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Skate Park should be proactively monitored to detect luminaire outages over a 25 year life- cycle.

#### **1.2 LIGHTING PERFORMANCE**

- A. Performance Requirements: Skating surfaces shall be lit to an average constant light level and uniformity as specified in the chart below. Light levels shall be held constant for 25 years. Lighting



calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Average illumination level shall be measured in accordance with the IESNA LM-5-04. Light levels shall be guaranteed from the first 100 hours of operation for the maximum warranty period.

Area of Lighting	Average Constant Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Skate Park	20 footcandles	3.5:1.0	192	10' x 10'

1. Lumen maintenance control strategy: A constant light system shall use automatic power adjustments to achieve a lumen maintenance control strategy as described in the IESNA Lighting Handbook 10th Edition, Lighting Controls Section, page 16-8: "Lumen maintenance involves adjusting lamp output over time to maintain constant light output as lamps age, and dirt accumulation reduces luminaire output. With lumen maintenance control, either lamps are dimmed when new, or the lamp's current is increased as the system ages."
2. Independent Test Report: Manufacturers bidding any form of a constant light system must provide an independent test report certifying the system meets the lumen maintenance control strategy above and verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer with outdoor lighting experience. If report is not provided at least 10 days prior to bid opening, the manufacturer shall provide the initial and maintained designs called for in this specification under Alternate Manufacturers, section 1.8.
3. Project References: Manufacturers bidding any form of a constant light system must provide a minimum of five (5) project references within the state of Colorado that have been completed within the last calendar year utilizing this exact technology. Manufacturer will include project name, project city, contact name and contact phone number for each reference.

### 1.3 **ENVIRONMENTAL LIGHT CONTROL**

- A. Spill Light Control: Maximum vertical footcandles taken with the meter aimed at the brightest light bank at the West Street line shall not exceed .05 footcandles, at the North Street line shall not exceed .005 Footcandles and at the Airport Runaway line shall not exceed .005 footcandles.

Maximum horizontal footcandles taken with the meter aimed at the brightest light bank at the West Street line shall not exceed .003 footcandles, at the North Street line shall not exceed 0 Footcandles and at the Airport Runaway line shall not exceed 0 footcandles.

Footcandle readings shall be taken at 30' intervals along the specified line. Average illumination level shall be measured in accordance with the IESNA LM-5-04 at the first 100 hours of operation.

\*\*\*Property line is defined as along the highway to the west and north and the start of the runway to the south.\*\*\*

### 1.4 **LIFE-CYCLE COSTS**

- A. Energy Consumption: The average kW consumption for the skate park system shall be 12 or less.
- B. Complete Lamp Replacement: Manufacturer shall include all group lamp replacements required to provide 25 years of operation based upon 300 usage hours per year.
- C. Preventative and Spot Maintenance: Manufacturer shall provide all preventative and spot maintenance, including parts and labor for 25 years from the date of equipment shipment. Individual lamp outages shall be repaired when the usage of any skate park lamp is materially impacted. Owner agrees to check fuses in the event of a luminaire outage.
- D. Remote Monitoring System: System shall monitor lighting performance, including on/off status, hours of usage and lamp outages. If luminaire outages that affect playability are detected, manufacturer shall contact owner so that maintenance can be proactively scheduled. The controller shall determine switch position (Manual or Auto) and contactor status (open or closed).
- E. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, fax or email up to ten years in advance.



Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities, to only having permission to execute "early off" commands byphone.

Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

- F. Management Tools: Manufacturer shall provide a web-based database of actual usage and provide reports by facility and user group.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility

Page 2 M-1652-enUS-1

2. Current lamp hours: shall be tracked separately to reflect the amount of hours on the current set of lamps being used, so relamping can be scheduled accurately

- G. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring systems for a period of 25 years.

- H. 25-Year Life-cycle Cost: Manufacturer shall submit 25-year life-cycle cost calculations as follows. Equipment price and total life-cycle cost shall be entered separately on bid form.

a.	<b>Luminaire energy consumption</b> # luminaires x kW demand per luminaire x kWh rate x 300 annual usage hours x 25 years		
c.	<b>Cost for spot relamping and maintenance over 25 years</b> Assume 7.5 repairs at \$ \$500 each if not included with the bid	+	
d.	<b>Cost to relamp all luminaires during 25 years</b> 300 annual usage hours x 25 years / 3,000 hours x \$125 lamp & labor x # luminaires if not included with the bid	+	
e.	<b>Extra energy used without base bid automated control system</b> \$ Energy consumption in item a. x % if control system not included with the bid	+	
f.	<b>Extra labor without base bid automated on/off operation</b> \$ per hour x # hours per on/off cycle x # cycles over 25 years if control system not included with the bid	+	
	<b>TOTAL 25-Year Life-cycle Operating Cost</b>	=	

## 1.5 **WARRANTY AND GUARANTEE**

25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years OR for the maximum hours of coverage based on the estimated annual usage, whichever occurs first. Warranty shall guarantee light levels; lamp replacements; system energy consumption; monitoring, maintenance and control services, spill light control, and structural integrity. Manufacturer shall maintain specifically-funded financial reserves to assure fulfillment of the warranty for the full term. Warranty may exclude fuses, storm damage, vandalism, abuse and unauthorized repairs or alterations. Group lamp replacements for constant light systems must occur in accordance with the independent test report provided by the manufacturer; alternate systems must relamp every 3,000 hours.

## 1.6 **DELIVERY TIMING**

Equipment On-Site: The equipment must be on-site 4 to 6 weeks from receipt of approved submittals and receipt of complete order information.

- A. be issued to the manufacturer indicating approval for the specific design submitted.

## 1.8 **ALTERNATE SYSTEM REQUIREMENTS**



- A. Compliance to Specifications: Acceptance of a bid alternate does not negate the contractor and lighting manufacturer's responsibility to comply fully with the requirements of these specifications. Any exceptions to the specifications must be clearly stated in the prior approval submittal documents.
- B. Light Level Requirements: Manufacturer shall provide computer models guaranteeing light levels on the Skate Park over 25 years. If a constant light level cannot be provided, the specified maximum Recoverable Light Loss Factor and maintenance/group relamping schedule shall be provided in accordance with recommendations in the Pennsylvania State University report "Empirical Light Loss Factors for Sports Lighting", presented at the 2009 IESNA Annual Conference.

Lamp Replacement Interval (hours)	Recoverable Light Loss Factor (RLLF)
3000	0.65

For alternate systems, scans for both initial and maintained light levels are required.

Area of Lighting	Average Initial Light Levels	Average Target/Maintained Light Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Skate Park	30.7 footcandles	20 footcandles	3.5:1.0	192	10' x 10'

- C. Revised Electrical Distribution: Manufacturer shall provide revised electrical distribution plans to include changes to service entrance, panel, and wire sizing.

## **PART 2 – PRODUCT**

### **2.1 LIGHTING SYSTEM CONSTRUCTION**

- A. System Description: Lighting system shall consist of the following:
- Galvanized steel poles and crossarm assemblies.
  - Pre-stressed concrete base embedded in concrete backfill allowed to cure for 24 hours before pole stress is applied. Alternate may be an anchor bolt foundation designed such that the steel pole and any exposed steel portion of the foundation is located a minimum of 18 inches above final grade. The concrete for anchor bolt foundations shall be allowed to cure for a minimum of 28 days before the pole stress is applied, unless shorter cure time is allowed by structural engineer of record.
  - All luminaires shall be constructed with a die-cast aluminum housing or external hail shroud to protect the luminaire reflector system.
  - All luminaires, visors, and crossarm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.
  - Manufacturer will remote all ballasts and supporting electrical equipment in aluminum enclosures mounted on pole approximately 10' above grade. The enclosures shall be touch-safe, and include ballast, capacitor and fusing, with indicator lights on fuses to indicate when a fuse is to be replaced for each luminaire.
  - Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
  - Control and Monitoring Cabinet (NEMA Type 4) to provide on-off control and monitoring of the lighting system, constructed of aluminum. Communication method shall be provided by manufacturer. Cabinet shall contain custom configured contactor modules for 30, 60, and 100 amps, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.
- B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, ballast and other enclosures shall be factory assembled, aimed, wired and tested.



- C. **Durability:** All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel of 18-8 grade or better, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the crossarms, pole, or electrical components enclosure.
- D. **Lightning Protection:** Manufacturer shall provide integrated lightning grounding via concrete encased electrode grounding system as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.  
  
If grounding is not integrated into the structure, the Manufacturer shall supply grounding electrodes, copper down conductors and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be not less than 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.
- E. **Safety:** All system components shall be UL Listed for the appropriate application.
- F. **Electric Power Requirements for the Sports Lighting Equipment:**
  - 1. Electric power: 480 Volt, 3 Phase
  - 2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

## **2.2 STRUCTURAL PARAMETERS**

- A. **Wind Loads:** Wind loads shall be based on the 2009 International Building Code. Wind loads to be calculated using ASCE 7-05, a design wind speed of 90, exposure category C and wind importance factor of 1.
- B. **Pole Structural Design:** The stress analysis and safety factor of the poles shall conform to 2009 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-5).
- C. **Foundation Design:** The foundation design shall be based on soil parameters as outlined in the geotechnical report.

Page 5 M-1652-enUS-1

## **PART 3 – EXECUTION**

### **3.1 SOIL QUALITY CONTROL**

- A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:
  - 1. Providing engineered foundation embedment design by a registered engineer in the State of Colorado for soils other than specified soil conditions;
  - 2. Additional materials required to achieve alternate foundation;
  - 3. Excavation and removal of materials other than normal soils.

### **3.2 FIELD QUALITY CONTROL**

- A. **Illumination Measurements:** Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA LM-5-04.
- B. **Correcting Non-Conformance:** If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, and maximum kilowatt



consumptions are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be liable to any or all of the following:

1. Manufacturer shall at his expense provide and install any necessary additional luminaires to meet the minimum lighting standards. The Manufacturer shall also either replace the existing poles to meet the new wind load (EPA) requirements or verify by certification by a licensed structural engineer that the existing poles will withstand the additional wind load.
2. Manufacturer shall minimize the Owner's additional long-term luminaire maintenance and energy consumption costs created by the additional luminaires by reimbursing the Owner the amount of \$1,000.00 (one thousand dollars) for each additional luminaire required.
3. Manufacturer shall remove the entire unacceptable lighting system and install a new lighting system to meet the specifications.

Page 6 M-1652-enUS-1

## REQUIRED SUBMITTAL INFORMATION FOR ALTERNATE SYSTEM

### Design Submittal Data Checklist and Certification for Alternate System Bids

*All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements*

Tab	Item	Description
A	Letter/ Checklist	Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included.
B	Equipment Layout	Drawing(s) showing field layouts with pole locations.
C	On Field Lighting Design	Lighting design drawing(s) showing: <ol style="list-style-type: none"> <li>a. Field Name, date, file number, prepared by, and other pertinent data.</li> <li>b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x &amp; y), Illuminance levels at grid spacing specified.</li> <li>c. Pole height, # of luminaires per pole, as well as luminaire information including wattage, lumens and optics.</li> <li>d. Height of light test meter above field surface.</li> <li>e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in footcandles (fc); uniformity including maximum to minimum ratio, coefficient of variance and uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.</li> <li>f. Alternate manufacturers shall provide both initial and maintained light scans using a maximum Recoverable Light Loss Factor (RLLF) as specified in section 1.8.</li> </ol>
D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
E	Life-cycle Cost Calculation	Document life-cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires, maintenance cost for the system including spot lamp replacement, and group relamping costs. All costs should be based on 25 Years.
F	Photometric Report	Provide photometric report for a typical luminaire used showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years experience.
G	Aiming Summar	Document showing each luminaire's aiming angle and the poles on which the luminaries are mounted. Each aiming point shall identify the type of luminaire.
H	Aiming Report	Provide test report showing aiming alignment can be maintained to 150 mph winds.
I	Control & Monitoring System	Manufacturer shall provide written definition and schematics for automated control system to include monitoring. They will also provide examples of system reporting and access for numbers for personal contact to operate the system.
J	Electrical Distribution Plans	If bidding an alternate system, manufacturer must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Colorado.
K	Performance Guarantee	Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed per specification for 25 years.
L	Warranty	Provide written warranty information including all terms and conditions.
M	Independent Testing Report	Manufacturer bidding any form of a constant light system is to provide an independent test report certifying the system meets the lumen maintenance control strategy defined in Section 1.2.A.1, verifying the field performance of the system for the duration of the useful life of the lamp based on lamp replacement hours. Report shall be signed by a licensed professional engineer with outdoor lighting experience.
N	Project References	Manufacturer to provide a list of projects where the technology proposed for this project has been installed in the state of Colorado. If any form of a constant light system is bid, a minimum of 5 project references completed within the last calendar year is required. For a depreciating light system a full list of projects completed within the past 3 years is required. Reference list will include project name, project city, and if requested, contact name and contact phone number.
O	Product Information	Complete set of product brochures for all components, including a complete parts list and UL Listings.
P	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.



<b>Q</b>	<b>Non-Compliance</b>	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.
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The information supplied herein shall be used for the purpose of complying with the specifications for Gunnison Skate Park. By signing below, I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

**Manufacturer:**

**Signature:**

**Contact Name:**

**Date: //**

## BID PROPOSAL

### Gunnison Skate Park Bid Proposal Skate Park Lighting Project Gunnison Park, CO

The undersigned bidder, in compliance with your request for bids for the lighting equipment at the above project, having examined specifications, related documents, and site of the proposed project, hereby proposes to furnish the lighting equipment material as described in the specifications. These prices are for all labor and materials and are to cover the specified equipment and delivery charges. The contract for bid item "A" will be based on the bid item "C" (The total cost of bid item A and bid item B).

- |  |    |                       |
|--|----|-----------------------|
| A. Bid Price:                                | \$ |                       |
| (Initial System Purchase Price)              |    |                       |
| B. 25-Year Operating Cost:                   | \$ |                       |
| (From Section 1.4, Item H – Life-cycle Cost) |    | (For Evaluation Only) |
| C. Total Cost of Ownership after 25 Years:   | \$ |                       |
| (Add item "A" and "B")                       |    | (For Evaluation Only) |
| Only)  |    |                       |

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Address

\_\_\_\_\_  
City/State/ZIP

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Date

Project References of similar scope:

1. Company Name \_\_\_\_\_



Contact  
Person\_\_\_\_\_phone\_\_\_\_\_

2.Company Name\_\_\_\_\_

3.Contact  
Person\_\_\_\_\_phone\_\_\_\_\_

4.Company Name\_\_\_\_\_

Contact  
Person\_\_\_\_\_phone\_\_\_\_\_

5.Company Name\_\_\_\_\_

Contact  
Person\_\_\_\_\_phone\_\_\_\_\_